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BMH Med. J. 2020;7(2):41-45. **Case Reports**

Anaesthetic Management During Laparoscopic Resection Of A Functioning Beta Cell Tumour (An Insulinoma)

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Abstract

Anaesthesiologists often encounter uncommon diseases in their medical practice. Stabilization and intra-operative management of such cases is always a challenge. Recently we had one such case (Insulinoma) with successful outcome. Recognizing fluctuations in blood sugar and maintaining within acceptable ranges is the key to successful outcome.

Keywords: Insulinoma, Neuro-endocrine tumour, Peri-operative dextrose.

Introduction

Insulinoma is a predominantly benign and rare neuroendocrine tumour [1]. It was first described by Harris et al. In 1923, he introduced the clinical possibility of spontaneous "hyperinsulinism", in patients with blood sugars below 70mg/dl whose symptoms improved by feeding [2]. The incidence of insulinoma is four per million persons each year, and insulinomas often present as a solitary pancreatic tumour [3]. Although the large majority of insulinomas are sporadic, upto 10% may be associated with hereditary multiple endocrine neoplasia type 1 [4]. Clinically it is diagnosed by Whipples pathognomic triad of symptoms which includes: repeated attacks of hypoglycaemia, documented hypoglycaemia (plasma glucose levels <50mg/dl) and immediate relief of symptoms by glucose administration [2].

Definitive treatment is surgical removal of the adenoma or either subtotal or total pancreatectomy. Most patients with benign insulinoma can be cured with surgery [5]. Persistent or recurrent hypoglycaemia after surgery tends to occur in patients with multiple tumours. About 2 percent of patients develop diabetes mellitus after surgery [6]. The major challenge for anaesthesiologist during surgery is prevention and control of wide swings in blood glucose levels during intraoperative period. We report a successful anaesthetic management of one of such case. The procedure was completed by laparoscopic technique.

Case report

An elderly male patient who is a known hypertensive since 15 years on regular treatment with

an Angiotensin Receptor Blocker (ARB) inhibitor presented with complaints of recurrent hospital admissions in view of hypoglycaemic episodes. These episodes were characterised by profuse sweating, generalised weakness and unresponsiveness. Each episode was diagnosed with Glucometer Random Blood Sugar (GRBS) values less than 50mg/dl and improved with intravenous infusion of dextrose solutions. He had these episodes occurring at least once in a year for the last 10 years.

Detailed history revealed perception of chronic weakness, between meals, especially at night which would relieve after ingestion of food. A consistent gain of weight was also noticed over the years. Physical examination revealed moderately obese patient with a BMI of 30.16 (Height - 183cms, Weight - 101kg). Laboratory reports showed a lowest GRBS value of 36mg/dl, plasma insulin level of 40mIU/ml and C-reactive peptide of 2070. Abdominal CT scan with contrast revealed a hypervascular lesion of 18 x 15 cms involving the distal pancreas, without liver metastasis or intra abdominal lymph nodes. Other hormonal studies including serum cortisol, parathyroid, ACTH and thyroid functions were normal, ruling out Multiple Endocrine Neoplasia (MEN). Hence a diagnosis of Insulinoma was made and he was scheduled for a laparoscopic distal pancreatectomy.

On pre-anaesthetic check-up, he had no other known comorbidities and revealed a moderate effort tolerance (METS>4). He gave no family history of endocrine disease or other medical illnesses. He had not undergone any surgical procedure or anaesthetic experience prior to the scheduled surgery. He had no allergy to any known medications. He gave history of snoring but no apnoeic episodes during sleep (STOP BANG – 4, implying intermediate risk). Airway assessment revealed normal mouth opening, a short neck (sternomental distance 11cm) with adequate movements and a Mallampatti score of 2. Electrocardiogram showed normal sinus rhythm with a heart rate of 75/minute. Echocardiogram showed a type 1 left ventricular diastolic dysfunction and mild concentric left ventricular hypertrophy (Ejection Fraction: 68%). Chest X-ray and routine blood parameters were within normal limits.

Patient was advised to omit morning dose of ARB inhibitor on the day of surgery and explained the NPO orders. He was kept on maintenance rate of IV Dextrose Normal Saline (DNS) during the fasting period. His GRBS was monitored 8th hourly until shift to the operation theatre. A value of 59mg/dl was recorded on the morning of surgery which was managed with infusion of IV DNS. He was shifted to the theatre after a premedication of iv Midazolam 1mg, Ondansetron 4mg, Pantoprazole 40mg and Dexamethasone 8mg.

On arrival in the operating theatre for the scheduled laparoscopic removal of pancreatic tumour, all ASA standard monitors were attached. An invasive arterial line was introduced into the left radial artery. He was induced with Fentanyl 200 mcg (titrated doses), Propofol 100 mg and Atracurium 50 mg. 80 mg Lignocaine was given prior to intubation. He was intubated with endotracheal tube of 8.5 ID, cuff inflated and tube fixed at 22 post confirmation of bilateral air entry. He was connected to the ventilator and ventilation commenced in Pressure Regulated Volume Control (PRVC) (Tidal Volume: 550 ml, Respiratory Rate: 15/min, PEEP: 5 cm H_2O. Pressure Maximum: 35cm H_2O). He was maintained at good depth using oxygen, air, Sevoflurane (MAC 0.8-1.3), Atracurium 40 mg/hour and Fentanyl 60 mcg/hour. His right internal jugular vein was cannulated with a 7 French triple lumen central venous catheter (CERTOFIX PROTECT). GRBS was monitored half hourly using point of care glucometry. Patient was maintained on both isotonic fluids like plasmalyte and ringers lactate as well as D5 with 25% dextrose. No hypoglycaemic events occurred intraoperatively. GRBS was maintained above 140 mg/dl. Hemodynamically patient remained stable throughout the laparoscopic surgery. A single Arterial Blood Gas (ABG) was taken at the beginning of surgery which revealed normal parameters. Hourly urine output was adequate. After

completion of surgery (3 and a half hour duration) neuromuscular block was reversed with injection Neostigmine 3.5 mg and Glycopyrrolate 0.6 mg. He was extubated and shifted to the post operative ICU with stable hemodynamics and minimal pain.

Post operative analgesia was achieved with IV Paracetamol 1 g 8^{th} hourly, IV Tramadol 50 mg 12^{th} hourly and a Diclofenac 50 mg suppository. Maintenance fluid comprised of Normal Saline and DNS. Postoperatively, GRBS was monitored 2^{nd} hourly for the first 24 hours and 4 times daily for the next 24 hours. Mean blood glucose levels were 181 mg/dl (minimum 148 mg/dl and maximum 214 mg/dl) on day 1 and 160 mg/dl on day 2 (minimum 140 mg/dl and maximum 180 mg/dl). Postoperative period was otherwise uneventful and patient was discharged on 7^{th} day.

Discussion

The maintenance of blood glucose levels within the normal range without wide fluctuations is essential in the anaesthetic management of patients with insulinoma. The common clinical signs of hypoglycaemia are of sympathetic stimulation; sweating, tachycardia and hypertension. Under general anaesthesia with good depth, these may be masked and can go entirely undiagnosed. Further, it may be misdiagnosed for other causes of sympathetic stimulation like hypovolemia, surgical stimuli, light plane of anaesthesia and drugs. The only certain sign is low blood glucose level measurement. Hence, the importance of frequent monitoring of the blood glucose levels is emphasized.

Akhtaruzzaman et al. [6] suggested checking blood glucose levels every half an hour in the intra-operative period. Prolonged periods of fasting prior to surgery can have effects on the blood glucose levels in insulinoma. A study by Fraser RA supports this finding [7]. Hence, IV Dextrose Normal Saline at the rate of 140 ml/h (maintenance rate) was started from 10:00 pm the day before surgery and 8th hourly blood glucose monitoring was done in the preoperative period.

General anaesthesia with propofol was considered as previous case reports [8,9] have favoured it for induction since it has no effect on insulin release and glucose regulation. Theoretically, maintenance with enflurane has been recommended [10] as the inhalation of choice. This is due to its advantage of increasing blood glucose levels by inhibiting insulin release. However, enflurane is no longer available in the Indian market. Hence, we chose to use sevoflurane for maintenance of anaesthesia. Normally tracheal intubation causes high sympathetic discharge which should increase the blood glucose levels. We blunted the stress response with titrated dosage of fentanyl and lignocaine prior to laryngoscopy. No significant fluctuation in gluose level was noticed post intubation. Hypocapnia decreases cerebral blood flow and glucose delivery and hypercapnia causes symptoms similar to hypoglycaemia. Hence, normocapnia was maintained throughout the surgery. As there are chances of severe hypoglycaemia during tumour handling, a continuous infusion of D5 with 25% dextrose at maintenance rate was maintained in the peripheral line. Chari et al suggests the immediate discontinuation of the dextrose infusion post removal of tumour [11] but we chose to adjust our infusion based on the GRBS values assessed throughout the surgery.

The total duration of anaesthesia lasted for 210 minutes. The blood glucose levels measured during the intraoperative period has been depicted below as a graph (**Figure 1**). The patient's blood glucose levels remained above 140 mg/dl and below 200mg/dl without gross fluctuations. There may be transient hyperglycaemia in the post-operative period due to counter regulatory hormones and this may necessitate additional insulin therapy [12]. Surgically missed tumour cells may also be a cause of post-operative hypoglycaemia. Hence,

blood glucose monitoring must be ideally continued in the post-operative period. We monitored the GRBS 2nd hourly for the first 24 hours and 4 times daily for the next 24 hours. Mean blood glucose levels were 181 mg/dl (minimum 148 mg/dl and maximum 214 mg/dl) on day 1 and 160 mg/dl on day 2 (minimum 140 mg/dl and maximum 180 mg/dl).

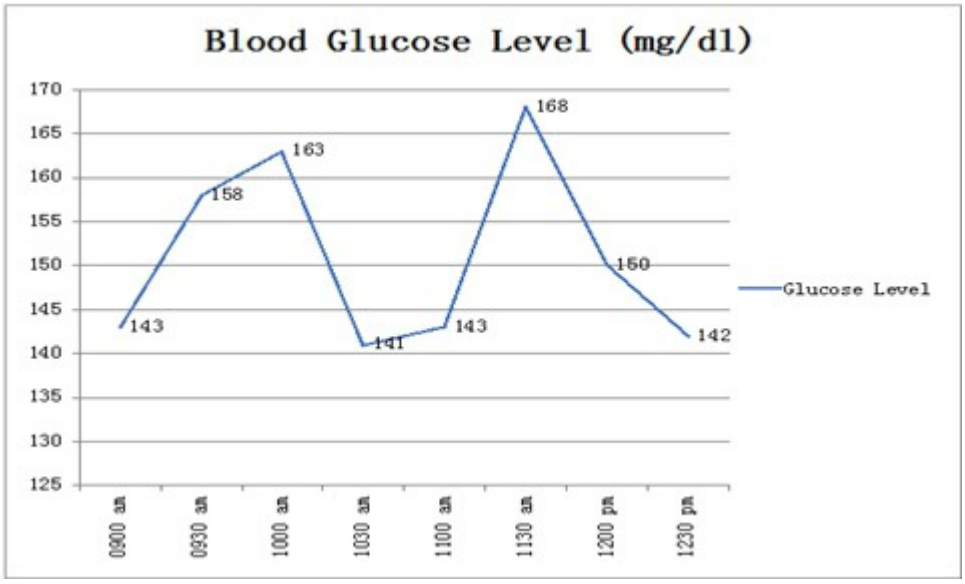

Figure 1

Conclusion

Perioperative dextrose infusions and frequent blood glucose monitoring aids successful anesthetic management of surgical resection of an insulinoma and safe discharge of patient from the hospital.

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